

NOVELTIES IN STROPHANTHUS

Joseph V. Monachino

In the course of a thorough revision of the genus Strophanthus over 3000 specimens were examined by the writer. Besides the herbarium sheets deposited in some 25 of the principal botanical institutions of the world, he studied the botanical material of recent expeditions initiated chiefly for the purpose of collecting Strophanthus.

So great was the interest in the genus as a possible precursor of cortisone, that no less than six expeditions explored Africa within the years 1949--1951. These expeditions had the definite object in mind to collect as many different species of the group as possible. The best collection examined by the writer was that of the Upjohn-Penick Expedition, headed by L. J. Brass and E. F. Woodward. The first set of this collection is now deposited with the New York Botanical Garden. The specimens obtain in Merck Research Laboratories "Strophanthus Expedition" to the west coast of Africa have not yet been distributed. J. Gerstner, A. Katz, J. Schmutz, P. Speiser, Dr. Hess and others located in most of the chief provinces of Africa have collected for T. Reichstein. A complete series of the specimens collected for the United States Public Health Service and the Division of Plant Exploration and Introduction by J. T. Baldwin Jr. is at the United States National Herbarium; and one collected for the Medical Research Council by R. D. Meikle in Nigeria is at the Royal Botanic Gardens at Kew.

The writer has seen at least most of the collections of the five expeditions mentioned above, and also freshly prepared material sent directly by individuals and institutions located in various places in Africa, and a few in Asia.

The plants collected by the French workers, R. Schnell and A. Chevalier, have not been examined by the writer. Schnell (6) suggested provisionally and informally three new varieties of Strophanthus hispidus and described without naming two forms or types of S. sarmentosus. Professor Reichstein informs the writer that he analyzed chemically the seeds of Schnell's different forms of S. sarmentosus and found practically no difference between them. Chevalier (3) named two forms of S. sarmentosus based on old species (S. senegambiae and S. Paroissei), and remarked on the variation in toxicity of the plants found in different regions. He added that the species is variable but that he was not able to distinguish stable varieties even in the living plants. The cultivated plants of S. hispidus seemed to him to belong to a race apart from the Fout-Djallon forest type. Late in 1950 Chevalier described S. punctiferus from the

vicinity of Abidjan. The type has not been available, but the writer examined a fresh collection from the type locality sent by Jacques Miège, who wrote that it was from the plant which he collected at Vridi and which Chevalier described under the name of S. punctiferus. The species is hardly distinct from the polymorphic S. sarmentosus.

Despite the extensive collections and close attention that has been focused on the genus by excellent workers, no other entity in it has been described in recent time. The writer, now having completed his exhaustive survey, has likewise failed to discover any very striking novelty. In every case when a plant distributed as Strophanthus appeared outstanding, examination proved it to be a member of Alafia, Cryptolepis, Pentopetia, Motandra, Rhynchodia, Pycnobotrya, or some other genus not related to Strophanthus. The one species that he thinks advisable to describe is very closely related to S. Preussii, and, furthermore, has already been given an herbarium name by Gilg. Two trivial varieties and three forms are also herewith proposed.

STROPHANTHUS ZIMMERMANNIANUS Monachino, sp. nov.

S. Zimmermannianus Gilg, chironym; Gilg ex Braun, Der Pflanze 6 (19): 299. 1910, nom. nud.

S. Preussii valde similis, differt lobis paracorollae deltoideo-lanceolatis valde longioribus quam latoribus et tubo corollae intus supra stamina glabro vel obscure papilloso non insigniter maculato.

Type: Zimmermann 1496, Tanganyika, Usambara, Ngonyaberg (Gonja), alt. 800 m., 15 Dec. 1907, "Strauch mit gelben Bl. Schuppen braun," deposited at the East African Herbarium (formerly Amani).

Additional specimens examined: Omari bin Bakari A H 9787, Tanganyika, "Usambaras, Sigi-Kisiwani, ca. 1500 ft. alt., 4 June 1941, a glabrous leaved liane, fruits up to 36 in. long, with a blunt lobed tip;" deposited at the East African Herbarium and the Royal Botanic Gardens at Kew.

A photograph of Omari bin Bakari A H 9787 appears in the Journal of the New York Botanical Garden 51 (610): 239. October 1950.

The species is very closely allied with the typical glabrous leaved variety of S. Preussii. S. Barteri and S. gracilis also belong in the same grouping, but these two are confined to West Africa.

The flowers of the Zimmermann specimen are badly damaged. The corolla-lobes are tailed, but their lengths cannot be observed because of their damaged condition. The follicles are slender and with dilated tips as in S. Preussii. The leaf-blades are more membranaceous and the old ones have clearer reticulation than is usual for S. Preussii, in this respect re-

sembling the leaves of S. Barteri. S. Zimmermannianus further resembles S. Barteri in the elongated-deltoid shape of the paracorolla-lobes.

S. Preussii is found in West Africa, the Belgian Congo where it reaches its greatest development, and it extends to Uganda and northwestern Tanganyika. S. Zimmermannianus grows in the highlands of northeastern Tanganyika. It must be rare on the Sigi. L.J.Brass, who visited the area, informs the writer that "Greenway himself did not seem to know of any species on the Sigi other than S. Courmonti. The Sigi is a short river rising in the Eastern Usambara Mts. and entering the sea a few miles north of Tanga. It is close to Amani, where Greenway lived, and he has done a lot of collecting on it."

STROPHANTHUS PREUSSII var. SCABRIDULUS Monachino, var. nov.

A varietate typica foliis subtus scabridulis recedit.

The leaves resemble those of S. gracilis, although the flowers are unmistakably those of typical S. Preussii. Leaves scabridulous beneath with many closely spaced, short, erect, sharp, stiff hairs. Hairs often also on petioles, sometimes on midrib above and elsewhere on the upper surface of the leaf. There are transitional states to the typical glabrous variety.

Type: P. T. L. Putman 118, Belgian Congo, "Epulu and vicinity, about 200 miles east of Stanleyville, 1935"; deposited at the Arnold Arboretum.

Many additional collections of this variety have been examined. They are from the Eastern Provinces of the Belgian Congo, districts of Stanleyville, Lova and Ituri (Bokuma, Epulu, Lubutu, Yambuya, Yangambi).

STROPHANTHUS PREUSSII var. SCABRIDULUS forma MULTINERVIS

Monachino, forma nov.

A forma typica nervis lateralibus numerosis 11--13-jugis plusminusve horizontalibus recedit.

Type: J. Louis 2365, Belgian Congo, "Yangambi, à 9 km. au N. du fleuve, 470 m. alt., lisière forêt primitive de plateau, 30 Nov. 1936"; deposited in the Jardin Botanique de l'Etat, Brussels.

STROPHANTHUS PREUSSII var. SCABRIDULUS forma PAUCINERVIS

Monachino, forma nov.

A forma typica nervis lateralibus praecipuis paucis 2--4-jugis adscendentibus recedit.

Type: J. Louis 4333, Belgian Congo, "Yangambi, à 7 km. au N.W. du Poste, ca. 470 m. alt., lisière forêt primitive de plateau, 5 July 1937"; deposited at the Jardin Botanique de l'Etat, Brussels.

STROPHANTHUS PREUSSII var. PREUSSII forma CREBRINERVIS

Monachino, forma nov.

A forma typica nervis lateralibus numerosis 11--13-jugis plusminusve horizontalibus recedit.

Type: J. Louis 1351, Belgian Congo, "Yalibwa, à 22 km. au N. de Yangambi, ca. 470 m. alt., sous-bois peuplement de Macrolobium Dewevrei le long de la rivière Lubilaya, 23 Feb. 1936, petit liane ligneuse, fleurs jaunes, 'Yjojo' (dialecte Turumbu);" deposited at the Jardin Botanique de l'Etat, Brussels.

This form is a glabrous leaved counterpart of S. Preussii var. scabridulus forma multinervis. It has also been collected at Bipindi, French Cameroons.

STROPHANTHUS SARMENTOSUS var. GLABRIFLORUS Monachino, var. nov.

A varietate typica floribus simul foliis expositis terminalibus paucis, sepalis corollaque extus glabris, et sepalis 5--10 mm. longis recedit.

Type: H. Pobeguïn 1288, French Guinea, "environs de Kindia, commun en bord de la ona-ona, 1905, n'est pas le S. sarmentosus pousse toujours au bord de l'eau et moins grimpant, fruit genre sarmentosus mais plus court, bout arrondi"; deposited at the Muséum d'Histoire Naturelle, Paris.

A photograph of the type appears in the Journal of the New York Botanical Garden 51 (610): 239. October 1950.

All the characters used to typify this variety are abundantly variable in the species. The taxon is proposed chiefly to designate an extreme.

Two additional collections are known from French Guinea.

Franchet examined type material of S. laurifolius and wrote that the flowers are puberulent outside. The species belongs with S. sarmentosus and its two varieties and consequently is involved in the varietal synonymy of S. sarmentosus.

STROPHANTHUS SINGAPORIANUS var. SINGAPORIANUS forma HIRTELLUS

Monachino, forma nov.

A forma typica foliis inflorescentiisque hirtellis recedit.

Type: J. Motley 760, Borneo, "Bangarmassig, 1857-8"; deposited at the Royal Botanic Gardens, Kew.

Other variations, such as glabrous or slightly pilose ovary in S. caudatus, large leaved, long petioled forms in S. Welwitschii, etc., have been observed, but the material available does not warrant any publication of even formae in these species.

Herbarium specimens demonstrate that all the species of Strophanthus having a wide distributional range are quite polymorphic. The species of limited range or habitat are probably

genetically likewise polymorphic, though this is less obvious from the poor representation of herbarium sheets. Morphological distinctions have been observed associated with geography and ecology, but most of these differences, highly dubious in the field, fail in the herbarium. Of special interest is the statement made by R. D. Meikle (2 & 4) regarding the different forms of S. sarmentosus in Northern and Southern Nigeria. The savanna form of the arid northern portion of the colony has smaller leaves and flowers, smaller more pointed follicles, and slimmer more gray and hairy seeds, in contrast to the stouter, chocolate colored seeds of the forest form of the south. Intermediate forms occur. Meikle adds that plants from seed germinated at Kew have retained the larger or smaller leaves of the parent plants. However trivial such variations may be from the taxonomic viewpoint, the great chemical differences, for instance in the sarmentogenin yield of the seeds (in S. sarmentosus a difference of about 100 times the amount in some samples), have a tremendous economic importance. This variation in chemical constituents, like that in morphology, is not definitive. R. K. Callow (2) points out that there are extremes in sarverogenin and sarmentogenin contents, with intermediates. Reichstein suggests that his MPD.50 is heterogeneous, not identical with the original Munch seeds from which sarmentogenin was first named. He also informs the writer that he already has found a better yielder. Further field studies like those of Brass, Meikle, Chevalier, and Schnell, and breeding work which has not yet been seriously begun, will cast light on a deeply significant problem. On the chemical aspect, studies are in progress. Naturally, it is not always feasible to identify specimens by the classical method of extraction, which requires at least 50 grams of seeds. Reichstein (5) has drawn comparisons between closely related forms by use of paper chromatography. The possibility of the use of histological technique to distinguish minor forms of the species needs study.

Fourteen species and 4 varieties of Strophanthus have been hitherto described since Gilg's monograph in 1903. Half of these are spurious. Five species are represented by one or two collections only. Four of these rare plants grow in the Belgian Congo. Here over half of the 30 known continental African species are found. The Belgian Congo would therefore appear to be the most likely region for the future discovery of novelties.

R. W. J. Keay noted regarding his collection 16012 from Oyo, Nigeria, "Commonly called S. sarmentosus A. P. DC. but differing from the high forest form. Note smaller flowers and leaves, the pointed fruit and plane of dehiscence. 13/10/49." The writer has seen other specimens of the small flowered, small leaved form, collected in Senegal, French Sudan, and also in Northern Nigeria (Katsina, Onmudinjoh 22369). Seeds of S. sarmentosus from Katsina have yielded sarmentogenin (2). Callow

(1) reports that the Emir of Katsina instructed district and village heads to organize collection of "Kwankwani" and 10,500 pods of S. sarmentosus were collected within 4 days. Keay has sent seeds of an Oyo plant to Lerck and Co., but results of chemical tests are not yet known.

The savanna specimens having character combinations of small flowers and leaves and sarmentogeniferous seeds may be worth a formal infraspecific name, for the sake of convenience if hardly for taxonomic purpose alone. This will often require field knowledge of the plant population and chemical tests of the seeds. Selection of a name for these chiefly chemical variants from previously published varieties and forms will be difficult and ambiguous. P. DeCandolle's typical variety of S. sarmentosus was from Sierra Leone. Sarmentogeniferous seeds of the species have been collected in Sierra Leone (2). But there are many examples of large flowered specimens from the same colony. It thus seems unwise to select the typical variety as the sarmentogeniferous kind, in which case a selection of name would have to be made for the forest variety. There is also uncertainty attached to S. sarmentosus var. pendulus (Kumm. & Hook.) Pax. S. sarmentosus var. major Dewèvre is a forest plant, while var. pubescens Staner & Michotte and forma Paroissei (Franch.) A. Chevalier are based on mixtures. Franchet wrote that the corolla-tube of S. laurifolius is 15 mm. long; there are two varieties of this species, S. laurifolius var. verticillatus P. DC. and var. oppositifolius P. DC. The species belongs with S. sarmentosus, and if it is adjudged a variety of typical S. sarmentosus, the varietal names become available. The illustration of S. sarmentosus forma senegambiae (A. DC.) A. Chevalier looks like the slender fruited, small leaved kind discussed above; only field work will clarify how it differs from S. laurifolius, which was probably also collected in Senegambia. The chemistry of the seeds is unknown. Reichstein's "Strophanthus spec. var. sarmentogenifera No LPD 50" has no botanical standing; it was not meant to be a formal publication of a taxon.

Summary: Few distinctive taxonomic novelties are to be expected in Strophanthus. The Belgian Congo appears the most likely place for their discovery. One new species, S. Zimmermannianus, very closely allied with S. Preussii, two minor varieties, and two forms are described. Some varieties or forms, possibly characterized by weakly morphological features, are extremely different chemically and thus of great economic significance. Field study is necessary to ascertain the taxonomy of these variants.

References

1. Callow, R. K., Expedition to Nigeria. M. R. C. search for tropical plants. British Medical Journal, pp. 1484--1485. June 24, 1950.
2. Callow, R. K., Meikle, R. D., & Taylor, W. I., The source of sarmentogenin. Chemistry & Industry, no. 17, pp. 336--337. April 28, 1951.
3. Chevalier, A., La question des Strophanthus à glucosides. Revue Internationale de Botanique Appliquée et d'Agriculture Tropicale 30 (327-328): 1--15. January-February 1950.
4. Meikle, R. D., The quest for cortisone. M. R. C. Expedition to Nigeria, 1949--1950. The Pharmaceutical Journal 165: 142--144. August 26, 1950.
5. Schindler, O., & Reichstein, T., Vergleich dreier Samenproben von Sarmentogenin liefernden Strophanthus-Varianten mit Hilfe von Papierchromatographie. Glykoside und Aglykone, 72. Mitteilung. Helvetica Chimica Acta 34 (2): 609--611. 1951.
6. Schnell, R., Notes et observations sur divers Strophanthus d'Afrique occidentale. Revue Internationale de Botanique Appliquée et d'Agriculture Tropicale 30 (337-338): 588--603. November-December 1950.

THE SEED CHARACTER OF CHRYSOPHYLLUM BEARDII Monach.

Joseph V. Monachino

When Chrysophyllum Beardii was originally described (Phytologia 3: 159. 1949) it was stated that an important matter left to be desired for understanding the species was the fruit with ripe seeds. Through the constant surveillance of Mr. R. S. Ayliffe, who had previously collected the type of the species and two other numbers, this desideratum has now become available.

Seeds, germinated seeds, and a fruit of C. Beardii (cit. no. Monachino 527A, deposited at the New York Botanical Garden) were collected by Mr. Ayliffe on July 26, 1951, from underneath a tree near the 23 1/2 mile post on the Long Stretch. Although the material was collected from underneath the tree its